FIRSTLY I WOULD LIKE TO START BY THANKING YOU ALL, THE SPEAKERS FOR THEIR EXCELLENT THOUGHT-PROVOKING TALKS, THE SESSION CHAIRMEN FOR ORGANIZING AND ANIMATING THEIR SESSIONS AND KEEPING THINGS BOTH UNDER CONTROL AND REASONABLY ON TIME. HOWEVER, MOST IMPORTANTLY, I WOULD TO THANK YOU ALL, THE PARTICIPANTS. WITHOUT YOUR INPUT, IDEAS AND DISCUSSION, THIS WORKSHOP WOULD NOT HAVE BEEN THE SUCCESS IT HAS.

When we started, I tried to outline what I felt we were trying to do here:

- Encourage communication between facilities
- Exchange ideas and opinions on subjects of common interest
- Find out what other people are doing
- Create contacts between people

I am very happy that in the last four days we have exceeded even my most optimistic expectations in all respects, here in the meeting room, during the sessions, and outside, socially, in the restaurant, in the bar and even occasionally on the ski slopes! I hope that the contacts that have been made here will continue in the future as I am convinced that they are very useful.

We have already heard very complete summaries from the session chairmen, and I will note even try to repeat them here. Instead, I would like to share with you my personal view of the meeting.

Today particle accelerators face many challenges. We are moving from an era of ‘beam quantity’ (i.e. How much beam can we accelerate? How many particles can we put on the target?) to an era of ‘beam quality’, both in the product we deliver and in the services we provide. I was struck several times by the similarities between our operations and commercial companies. Words like quality control, customers (not users), service and product kept coming back in many of the discussions. With this in mind, I think we have to understand that our product is changing. Now we deal with many quality control issues in our control rooms, such as beam stability in SR sources, minimizing losses for radiation and safety concerns, beam brightness for LHC, minimizing refill times. In fact, one speaker was asked what is the most important factor in determining beam quality at his facility, and he replied beam size on target, even though they are in the middle of an energy upgrade!

On top of all these issues our control rooms provide many other services, as well as running accelerators to produce beam. We have heard about many of these during this week:

- Operating access systems
- Running machine safety systems
- Running large cryogenics facilities
- Providing water and electricity services for large laboratories
- Responding to fire alarms and any other emergencies
- Crisis management during incidents

With all these tasks to complete, and complete in parallel, it is not surprising that the discussion on ’stress’ in our control rooms triggered many bells with me and many other participants.

We can summarize this by saying that an accelerator operator today has many more tasks than just pushing buttons to turn beams on and off. In this context, I believe that this issue of stress and operator environment is something that we have to take very seriously. Management, and here I include myself, cannot expect operators to complete more and more tasks on multiple machines indefinitely. We need to supply better tools to do the job, electronic logs, improved system automation etc. In addition
we also need to give operators the optimum environment in which to work, and we should remember to consult them when designing and/or changing their working environment. Because, in the end, it is relatively easy to find excellent accelerator physicists and project managers, but good accelerator operators are hard to find and even harder to keep.

On this question, I am not 100% convinced that the DESY system, where everyone does shifts is the way to go for my group, but I will definitely think about getting a few people from other groups into the control room shift rota, when I go back to CERN. This seems to have two large benefits, easing the shift load on existing operators, and improving inter-group communications and understanding.

For the idea of the ‘global operation’ of a machine, I am again unconvinced about this as a realistic method tool for everyday operation, but it may be useful to start looking at something, at least for accelerator physics experiments. Before we can envisage a test, we will need to install a console from one laboratory in another control room, and be prepared to let the second laboratory use it! Here I think that there are already big possibilities for progress inside CERN between the SPS and PS control rooms.

It is not particularly hard to imagine overcoming the technical problems behind installing a PS control console in the Fermilab control room, but supposing that we do, then Fermilab operators will need to know how it works. Therefore, maybe we will have to be prepared to exchange operators between laboratories for extended periods of time to prepare for such a test. Such exchanges are also very useful in helping to exchange ideas between different control rooms. Hopefully some of the contacts that have been made here will help to facilitate this.

I feel, along with many others, that this workshop is very useful and should continue. So I am very happy to announce that there is a proposal to hold the next WAO in 2003 at KEK in Japan. Several other laboratories in North America and Europe are also interested in organizing subsequent meetings after 2003. So the future looks very bright.

Finally, I would like to give some advice to any organizers of future workshops. ‘Get the best organizing and programme committees that you can’. I did and it is thanks to them that this meeting has been such a success.

Simon Baird
Chairman of the Local Organizing Committee